

CLAIMS

What is claimed is:

1. A system for estimating body states of a vehicle comprising:
 - at least two sensors mounted to the vehicle, the sensors generate measured vehicle state signals corresponding to dynamics of the vehicle;
 - a signal adjuster which transforms the measured vehicle states signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and
 - a filter which receives the transformed measured signals from the signal adjuster and processes the measured signals into body state estimates of the vehicle.
2. The system of claim 1 wherein the filter includes a model of the vehicle dynamics and a model of the sensors, the state estimates being based on the transformed measured signals and the models of the vehicle dynamics and sensors.
3. The system of claim 3 wherein the filter includes an estimator, an algorithm being implemented in the estimator to process the transformed measured signals and the models of the vehicle dynamics and sensors and generate the state estimates.
4. The system of claim 1 wherein the sensors are linear accelerometers.

5. The system of claim 1 wherein one of the sensors is an angular rate sensor.
6. The system of claim 1 wherein the sensors include two accelerometers that measure accelerations in a first direction and two accelerometers that measure accelerations in a second direction.
7. The system of claim 6 wherein the sensors further include two accelerometers that measure accelerations in a third direction.
8. The system of claim 1 wherein the sensors include two accelerometers that measure lateral accelerations and one sensor measures the yaw rate of the vehicle.
9. The system of claim 8 wherein the sensors include two accelerometers that measure the vertical accelerations of the vehicle.
10. The system of claim 1 wherein the state estimates relate to the vehicle's lateral velocity, yaw rate, roll angle, and roll rate.
11. The system of claim 1 wherein the signal adjuster further provides compensation for gravity biases associated with the sensors.

12. A method for estimating body states of a vehicle comprising:
 - generating measured vehicle state signals corresponding to dynamics of the vehicle with at least two sensors;
 - transforming the measured vehicle states signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and
 - processing the measured signals into body state estimates of the vehicle.
13. The method of claim 12 system of claim 1 wherein the processing includes modeling the vehicle dynamics and the sensors.
14. The method of claim 12 wherein the generating includes measuring linear accelerations.
15. The method of claim 12 wherein the generating includes measuring an angular rate of the vehicle.
16. The method of claim 12 wherein the state estimates relate to the vehicle's lateral velocity, yaw rate, roll angle, and roll rate.
17. The method of claim 12 wherein the transforming includes providing compensation for gravity biases associated with the sensors.